EXHIBIT A

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF WEST VIRGINIA
AT CHARLESTON

IN RE: ETHICON, INC., PELVIC REPAIR SYSTEM PRODUCTS LIABILITY LITIGATION	**Master File No. 2:12-MD-02327** **MDL 2327** **JOSEPH R. GOODWIN** **U.S. DISTRICT JUDGE**
THIS DOCUMENT RELATES TO: **CONSOLIDATED TRIAL** ***Mullins, et al. v. Ethicon, Inc., et al.*** **CASE NO. 2:12-CV-02952**	

GENERAL EXPERT REPORT

OF

DR. HARRY JOHNSON, JR., M.D.

REGARDING TVT

Prepared by:

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Harry Johnson, M.D.- Expert Report

Education, training and experience:

I am Board certified in OB/GYN and Female Pelvic Medicine and Reconstructive Surgery. I am a surgeon who practices in Baltimore, Maryland, at the University of Maryland Medical Center. I completed medical training at Wake Forest University, Bowman Grey School of Medicine in 1984. After obtaining a MD, I completed an internship in General Surgery in 1985 at Wake Forest University Medical Center, followed by OB/GYN residency at University of Maryland Medical Center.

I then served in the U.S. Navy Medical Corps where I held a teaching position at the National Naval Medical Center in Bethesda, MD in OB/GYN. At Bethesda, I was a teaching physician in the OB/GYN residency specializing in gynecologic surgery and urogynecology. In addition, I served in the Persian Gulf War. Upon completing military service, I joined the faculty at the University of Maryland Medical Center and completed a pelvic surgery fellowship at Greater Baltimore Medical Center. On returning to University of Maryland, I established the Division of Urogynecology and Pelvic Reconstructive Surgery. Since arriving here in 1992, my practice has been focused on urinary incontinence and pelvic organ prolapse in women.

Since 1992, I have presented invited lectures on surgical and medical management of urinary incontinence and pelvic organ prolapse. In addition, I have taught community physicians to perform surgical procedures.

I was the OB/GYN Residency Training Director from 1994 through 2005. I have trained 19 fellows in urogynecology and pelvic reconstructive surgery. Currently, I am the Vice Chairman of OB/GYN, Division Director of Urogynecology and Reconstructive Surgery. My academic rank is Associate Professor in OB/GYN, Associate Professor of Surgery, Division of Urology. I am actively involved in teaching of OB/GYN and Urology residents.

I am a very active surgeon performing approximately 50 slings per year and 100 prolapse procedures per year. I have performed at least 750 polypropylene midurethral slings. I work in a tertiary medical center and am a regional resource center for evaluation and treatment of complications related to incontinence and prolapse surgery. I currently use TVT-O and TVT-Exact. TVT-Exact is identical to TVT classic except with slightly smaller needles.

I am a co-principle investigator and founding member of the Urinary Incontinence Treatment Network (UITN) which was established by the National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK) in 2000. The UITN consists of 9 major medical centers and one data collection center:

- University of Alabama at Birmingham, Birmingham, Alabama
- Department of Veterans Affairs, Birmingham, Alabama
- Loyola University Stritch School of Medicine, Chicago, Illinois
- University of Texas Southwestern, Dallas, Texas
- New England Research Institutes, Wate1town, Massachusetts

- Duquesne University, Pittsburgh, Pennsylvania
- Kaiser Permanente, San Diego, California
- William Beaumont Hospital, Royal Oak, Michigan
- University of Texas Health Sciences Center, San Antonio, Texas
- University of Maryland, Baltimore, Maryland

The UITN Network conducted large, prospective, randomized, surgical trials of the most common treatments for women with urinary incontinence from 2000-2010. We performed trials of fascial slings, Burch colposuspension and midurethral synthetic slings, primarily TVT, TVT-0 and Monarch slings under the direction of the National Institute of Health (NIH) My CV is attached as Exhibit A.

My opinions are held to a reasonable degree of medical and scientific certainty. My opinions are based on my education, training, knowledge, personal and clinical experience, publications, lectures, teaching, review of the literature, interactions with colleagues, and a list of materials I have reviewed and which I may use at trial is attached as Exhibit B in addition to those set forth in my CV.

My rates for expert work are:

- $400.00/hour: telephone consultation, record review, literature search, deposition review
- $600.00/hour: deposition meetings, deposition testimony, pre-trial meetings
- $2500.00 half-day (plus expenses): court testimony
- $5000.00 entire day (plus expenses: court testimony

In the past four years I have given expert testimony in the following cases:

- 6/30/10, Knight v Raheja deposition
- 4/20/11, Sosnowich v Steren deposition
- 4/13/11, Conti v Women's OB/GYN deposition
- 4/8/12, Sosnowich v Steren court testimony
- 11/6/13, Richardson v Miller deposition
- 8/28/13, Woods v Cossell deposition
- 3/20/13, Rodriguez v Rao deposition
- 2014, Fleming v. Pleeter
- 2014, Stidham
- 2015, Streaker v. Boushehri
- 2015, Ehrsam v. Hopkins
- 2015, Harris v. McMillan
- 2016, Powers v. Harrison

Urinary Incontinence:

Urinary incontinence affects up to 50% of women with range of 10-70%. It may be higher as it is an under reported condition. The prevalence of urinary incontinence has a broad peak in middle age and increases steadily in the elderly. The prevalence varies widely in the literature due to the use of different definitions, survey methodology and survey sample. The estimated annual cost of treatment exceeds 16 billion dollars per year.

Urinary incontinence has multiple etiologies that may be classified as genitourinary and non-genitourinary in origin. Non-genitourinary etiologies include functional, environmental, pharmacological and metabolic causes. Genitourinary etiologies include: (a) fistula (a hole in the urethra, bladder or ureter), (b) congenital abnormality of the genitourinary tract, and (c) filling and storage disorders, which comprise the majority of incontinence cases. These disorders are divided into urodynamic stress incontinence, detrusor over-activity and mixed incontinence.

Among ambulatory women, the most common etiology of urinary incontinence is urodynamic stress incontinence, accounting for 15-80% of cases, detrusor over activity accounts for 7-33%, and the remainder are mixed forms of stress urinary incontinence and detrusor over activity. Urinary incontinence is a prevalent condition with significant medical, social and psychological ramifications. It is a symptom and not a diagnosis and is seen in all age groups. It is more common with aging and is often mistakenly viewed as a normal part of aging.

Risk factors for incontinence include:

Child bearing, higher parity, elevated birth weight, mode of deliver
Aging and age related changes
Obesity
Caucasian> black women
Previous hysterectomy or GYN surgery Tobacco use, worse with current use
Pelvic organ prolapse
Prior incontinence surgery
Urethra mobility

Diagnosis and treatment of incontinence requires a careful workup for evaluation. The extent of the workup is dependent on the severity of the incontinence and may include as indicated:

History and physical exam
Measurement of urethral mobility
Laboratory tests
Simple urodynamics
Complex urodynamics
Cystourethroscopy

Why does stress incontinence occur?

There are two major contributing factors in development of urodynamic stress incontinence: Urethral hypermobility
Intrinsic sphincter deficiency

Urethral function is critical in maintaining urinary continence. Continence is maintained by keeping the pressure in the urethra greater than the pressure in the bladder. Normally when the intravesical pressure increases, there is an increase in urethral pressure maintaining the pressure gradient at the urethra to prevent leakage. The urethra rests on a hammock of connective tissue called pubocervical/endopelvic fascia. It holds the urethra in position and prevents rotational descent of the urethra into the vagina. The role of end pelvic fascia is to support the bladder and the urethra preventing hypermobility. The endopelvic fascia supports the urethra through the pubourethral ligaments. Proper quality of the fascial structural elements providing support is crucial for adequate function of the voiding mechanism.

Urethral hypermobility results from loss of support of the pubourethral ligament and endopelvic fascia. When this occurs, the urethra drops out of its normal intra-abdominal position during stress, such as laugh, cough or sneeze. This results in vesical pressure becoming higher than the Urethral pressure and leakage occurs. When the stress event is over, the pressure gradient returns and normal continence is maintained. Intrinsic sphincter deficiency results from a failure of the urethral sphincter. It is no longer a water-tight valve. Any increase in intravesical pressure may result in leakage of urine through the sphincter. Incontinence is generally more severe as it occurs at very low urethral pressure.

There are many factors responsible for maintaining the urethral sphincter mechanism allowing patients to remain continent. Factors responsible for maintaining function of the urethral sphincter and urethra include blood vessel turgor, elastin and collagen within the urethral wall, the urethral epithelium and the innervation of the vesicle neck in urethra. The voluntary intrinsic continence mechanism comprises the periurethral striated muscle of the pelvic floor. The levator ani muscle maintains proper position of the urethrovesical junction within the pelvis and when contracted provides occlusive force on the urethral wall.

Treatment options:

Treatment of stress urinary incontinence includes nonsurgical and surgical options. In general both options have had success. Nonsurgical options are generally tried first and failure directs the patient to surgical repair.

Nonsurgical options:

Nonsurgical therapy is generally offered prior to and surgical management. Up to 50% of women may improve enough to forego surgical treatment initially, however >90% of these patients remain incontinent and > 60% may subsequently seek surgical management. Nonsurgical options include:

a. Absorbent products to protect patient's clothes. The cost of incontinence products in the United States exceeds 4 billion dollars for all types of incontinence.
b. Estrogen. This was theoretically thought to improve incontinence in postmenopausal women, however, this has not proven effective in clinical trials for stress incontinence.
c. Behavioral modification. Stress incontinence may improve with behavioral changes such as weight loss, smoking cessation, discontinuing alcohol and caffeine, fluid intake, management and modification of physical activity.
d. Pelvic floor physical therapy. This is designed to strengthen levator muscles of pelvic floor and increase voluntary control of pelvic floor muscles used to maintain continence. Kegel exercises are performed under the direction of a physical therapist to be optimally effective. Vaginal cones may be used to aid in specific muscle contraction.
e. Biofeedback. This provides the patient with feedback on contraction of pelvic floor musculature to improve the results from pelvic floor physical therapy.
f. Electrical stimulation. This is a passive technique that does not require participation of the patient. Electrical energy is used to cause muscle contraction to effect strengthening of the pelvic floor musculature.
g. Mechanical devices. Vaginal pessaries provide support to the urethra and may be effective in some women with stress incontinence.

Historical perspective:

Stress urinary incontinence (SUI) has been corrected surgically since the early 1900's when Kelly and Dumm first published their series on anterior vaginal plication in 1914. Since that time, many procedures have been developed attempting to improve efficacy and/or decrease morbidity. An ideal goal for surgical repair of stress urinary incontinence is achievement of long term continence with low rates of complication. Over 100 surgical procedures have been described to treat stress incontinence surgically. The mean age for women who undergo surgical treatment is approximately 50. Expected life time of females is greater than 75 years. As a result, women may live longer than 25 years after their incontinence surgery. It is well known that the first surgery is the most important one and recurrent surgeries show lower success rates. This emphasizes the importance of long term durability of the first surgical procedure performed to treat incontinence. A brief description of the most common procedures used in the past 100 years follows.

1. Anterior colporrhaphy with Kelly Plication:

Anterior colporrhaphy was initially described by Schultz at the end of the 19th century and modified by Kelly to treat SUI A vertical incision is made in the midline of the vagina, which is then dissected away from the bladder neck. The endopelvic fascia is then approximated in the midline supporting the bladder, bladder neck and proximal urethra. The short term success rate is comparable to colposuspension. Subjective and objective cure rates in meta-analysis were 81% and 71% initially. However, long term success rates were disappointing with rates decreasing to approximately 65% after one year and 37% after 5 years. In one large study of 519 patients, major complications were noted in 1% with 2 urethrovesical fistulas and 6% of cases

developing de novo over active bladder. The procedure has been abandoned in the treatment of SUI because of poor long term results.

2. Marshall-Marchetti-Krantz cystourethropexy (MMK):

The MMK was first described in 1949. It is a transabdominal procedure requiring a large suprapubic incision exposing the space of Retzius and the bladder neck. Three sutures are placed above the urethra and one at each side of the vesical outlet. The urethra is then attached to the periosteum of the pubis or cartilage of the symphysis pubis. This is designed to return the urethra to its retropubic position. The long term results were satisfactory with 5-year cure rate of 86%. The MMK procedure has been abandoned due to high complication rate which is greater than 20% including urethral-vaginal fistula and osteitis pubis. Long term voiding disorders and de novo detrusor instability occurred in approximately 11% of patients.

3. Burch colposuspension:

In 1961, Burch described an alternative transabdominal technique sparing the urethral wall and pubic bone. It is an open abdominal procedure requiring dissection into the space of Retzius behind the symphysis pubis. The procedure may be associated with large blood loss as there is an extensive venous plexus overlying the vagina lateral to the urethra, vesicle neck and bladder. The procedure requires general anesthesia and generally a 2-3-day hospital stay. The procedure is performed by placing 2-3 sutures in the paravaginal tissue lateral to the urethra and bladder neck and attaching them to the ipsilateral ileo peritoneal (Cooper's ligament) on the pelvic side wall. This is performed bilaterally. A meta-analysis of the procedure revealed an objective continence cure rate of 84.3%, long term cure rates 82% at 5 years, and 69% at 12 years.

Short term complications of Burch colposuspension include voiding difficulties, urinary retention, blood loss and bladder injury with placement of suture through the bladder wall. In addition, there may be ureteral injuries, postoperative wound infections as well as other complications seen with major abdominal surgery. Long term complications include voiding dysfunction, development of de novo urgency as high as 36%, and urge incontinence. Obstructive voiding symptoms have been reported in as high as 36% of patients with long term follow-up. Pelvic organ prolapse is much more common after Burch colposuspension and has been reported in as high as 37% of patients with the major defects being rectocele and enterocele, often requiring a second surgical procedure for correction. Patients may also develop recurrent urinary infection, as well as pelvic pain.

Burch colposuspension was compared to fascial slings by the Urinary Incontinence Treatment Network, which was sponsored by the National Institutes of Health. I was an investigator in this study. The SISTEr Trial, reported by Albo, et al. compared Burch colposuspension to fascia sling. At 2 years, the Burch procedure showed lower success rate with serious adverse events in 10% and adverse events in 47% of patients. This study was followed by E-SISTEr at 5 years and 7 years as described by Brubaker and Richter, which revealed decreasing continence rates for the Burch dropping from 42% year 2 to 24% at year 5 and 13% at

year 7. The 5-year satisfaction rate was higher in women undergoing the sling with 83% versus 73% in women undergoing Burch colposuspension.

The Burch colposuspension when compared to midurethral sings, has higher complications rates, significantly longer recovery times and decreasing long term durability. The difficulty of the procedure combined with the complication rate and low success rate resulted in many gynecologists abandoning the procedure in favor of midurethral slings. Factors associated with the decrease incontinence rate from Burch and fascial sling in the 5-year E-SISTEr study included long term continence, Burch procedure itself, hist01y of previous urinary incontinence surgery, postmenopausal without hormonal replacement therapy and higher mesa urge index.

In the 1990's, laparoscopic Burch was investigated to treat urodynamic stress incontinence. The procedure allowed surgeons to avoid large abdominal incision resulting in shorter hospital and greater return to normal activity. A randomized trial of laparoscopic Burch versus TVT in 2004 revealed a higher rate of urodynamic stress incontinence with laparoscopic Burch. TVT had a greater objective and subjective cure rate than laparoscopic Burch at 1 year. Disadvantages of laparoscopic Burch included a steep learning curve, use of general anesthesia, abdominal entry was required along with pneumoperitoneum subjecting the abdominal organs to complication. Three-to-four abdominal incisions were required for performance of the procedure.

4. Needle procedures:

Needle procedures were popularized in the 1960's as a minimally invasive procedure to perform a bladder neck suspension. The first technique was described by Pereyra in 1959. A longitudinal incisional is made in the anterior vaginal wall exposing the bladder neck. A monofilament suture is placed on either side of the bladder neck in the endopelvic fascia. A suprapubic incision is made and a needle is passed retropubically through the space of Retzius using a long needle. The monofilament suture is pulled through and tied over the rectus fascia elevating the bladder neck. The procedure was modified by Stamey by placing Dacron pledgets to prevent the suture from pulling through the endopelvic fascia.

While the procedure was minimally invasive, it was found to have significant complications. The incidence of de novo detrusor instability and postoperative voiding difficulties was 5-8%. A suture had to be removed in 4-9% and infection of the Dacron buttress occurred in 10-12%. A 2004 Cochrane analysis concluded that needle suspension was more likely to fail than open abdominal retropubic suspension after the first year, 29% versus 16%. Long term results were even worse with subjective cure rates less than 50% at 2 years and less than 10% at 10 years.

5. Sling Procedures:

The first pubovaginal sling (PVS) procedure was described in 1907 by Van Giordano using gracilis muscle. Various modifications were made over the next 30-40 years using different types of muscle and fascia. By 1942, both rectus fascia and fascia lata were described as the tissue used for sling, first by Price and then Aldridge. Fascial slings required the harvesting of autologous fascia from either the rectus sheath of the abdominal wall or the fascia lata in the

lateral thigh obtained just above the knee. The sling procedure also requires an incision in the abdomen and an incision in the vagina. The autologous fascia is passed through the space of Retzius around the urethra and attached bilaterally to the rectus fascia or sewn over the rectus fascia. The procedure is designed to support the bladder neck and the proximal urethra. Various modifications were made to the sling procedure including attaching the sling to the pubic bone with bone anchors and use of porcine dermis, bovine pericardium, human cadaveric fascia lata and human cadaveric dermis. Complications were fairly extensive and the procedure was best performed by very experienced surgeons. Complications included urinary retention, foreign bodies in the bladder and urethra, damage to the bladder and urethra, new onset of voiding dysfunction, pelvic and suprapubic pain, nerve entrapment, dyspareunia, urinary obstruction and de novo detrusor instability. The biologic products resulted in high failure rates than autologous fascia. The Urinary Incontinence Treatment Network performed the SISTEr, Stress Incontinence Surgical Treatment Efficacy Trial and E- SISTEr trial which compared Burch with fascial sling. In this study, rectus fascia was used. At 2 years, patient satisfaction was found to be high with both fascial sling and colposuspension with success rate at approximately 85% for slings and 75% for colposuspension. A steady decline was seen in the cure rate for urinary incontinence with the Burch decreasing to 13% after 7 years and 27% continence rate in the pubovaginal sling group. The SISTEr and E-SISTEr data also revealed serious adverse events in the fascial sling group with serious events found in 13% and adverse events of all kinds in 63%. Voiding dysfunction was more common in the fascial sling group at 14% and 27% of patients required treatment for postoperative urge incontinence. The higher success rates of the fascia sling were offset by higher rates of urinary tract infection, urge incontinence, voiding dysfunction and the need for surgical revision to improve voiding. I was an investigator in these trials and saw first-hand the complications associated with Burch colposuspension and fascial slings, both short term and long term.

6. Vesica:

The vesicovaginal wall sling was the first kit based procedure introduced for incontinence in the mid 90's. The vesica was a variant of the Giddies procedure and employed bone anchors to attach the sutures to the symphysis pubis allowing the surgeon to avoid an incision in the anterior abdominal wall. The bone anchors were placed in the symphysis pubis through the vaginal incision and sutures thread through the anchor and a sling constructed from the vaginal wall by placing sutures lateral to the urethra. A synthetic mesh could be placed instead of using vaginal wall as the sling material. The vesica vaginal wall sling was abandoned due to low cure rates of incontinence and increased complications which included pubic bone pain as well as osteitis pubis and osteomyelitis of the pubic bone, although rare were devastating complications.

Bulking agents:

Bulking agents were approved by the FDA for injection into the urethral sphincter for incontinence due to intrinsic sphincter deficiency only. This required documentation of urinary leakage with low midurethral closure pressure. The technique used was to inject a bulking agent, either directly through a cystoscope or thorough the vaginal wall with endoscopic guidance of material. The problem with this procedure was that it was not permanent and required periodic reinjections into the urethral sphincter. The injections were performed under local anesthesia in

the physician's office or surgicenter. Patients were allowed to void after the procedure and if unable to void, performed self-catheterization until they were able to void. The average success rate was between 30-50%. When leakage returned, the sphincter muscle was reinjected. A collagen material was used initially and this has subsequently been removed from the market.

Non-mesh treatment options, Conclusion:

From 1900-2000, over 100 operative procedures were described and tried to surgically treat stress urinary incontinence. An ideal goal for surgical treatment for incontinence is achievement of long term continence with low rates of complication. Surgeons attempted to combine procedures that were minimally invasive, provided better results, shorter recuperation, decrease side effects, and return of the bladder to normal function allowing patients to return to normal activities and normal daily life. The minimally invasive procedures initially described, namely needle procedures and fascial slings, either resulted in low cure rates or high complication rates. The abdominal procedures, MMK and Burch colposuspension, initially had good success rates, but success rates declined over time resulting in poor long term results. In addition, significant adverse outcomes and complications were seen. Clearly the results of non-mesh surgical procedures resulted in surgeons searching for a low morbidity procedure with a high long term success rate and return to normal function of the bladder.

Reasonableness and Effectiveness of TVT's Design:

Tension free vaginal tape (TVT) is a sling kit used to treat stress urinary incontinence (SUI). The kit contains Prolene mesh that is 1.1 cm. wide, 45 cm. long and covered in transparent plastic wrap. A trocar is fused to each end of the tape and is used for insertion of the mesh sling. Once the mesh is placed, excess mesh, trocars and plastic sheath are removed. Approximately 25 cm. of 1.1 cm. wide mesh remains in the patient after placement. Textile property characteristics of the TVT mesh are large pore size, 1,379 um., low stiffness, 0.09 (N/mm), relative elongation at the inflection point percent 71.2% and mesh edges/features of tanged or laser cut.

Polypropylene mesh has been used to repair defects in the body since the 1950's. The early surgical literature describes the use of polypropylene mesh in hernia repair. The first of which was Marlex mesh. In 1969, Ethicon developed Prolene suture for cardiovascular use, hernia repair, pelvic floor repair and other repairs. Ethicon developed large pore polypropylene mesh in 1974 to treat hernia defects.

Initial study and development of TVT synthetic sling was performed by Dr. U. Ulmsten in the 1990's. He described a minimally invasive ambulatory sling procedure. He initially worked with Gortex and Mersilene tapes but found high complication rates and abandoned this material. After which he began working with wide pored, monofilament polypropylene mesh.

In 1996, Dr. Ulmsten published the first article describing modified intravaginal slingplasty. This was a prototype of the TVT procedure:

- Two-year study

- 75 patients
- Local anesthesia with minimal IV sedation
- 84% of patients subjectively and objectively cured
- No intraoperative and postoperative complications
- Appropriate healing of vaginal wall
- No evidence of mesh erosion or extrusion

Ulmsten felt it could not be compared to conventional slings as they require much more extensive dissection and are located at the bladder neck. Fascial slings required harvesting fascia (from leg or abdomen with attendant surgical site morbidity), and an abdominal and vaginal incision. Burch required abdominal incision and dissection. When compared to Burch colposuspension or fascial sling the new slingplasty has significantly shorter operating time, was performed under local anesthesia and less surgical complications, as well as significantly less urinary retention. These were significant advances to the conventional sling and colposuspension leading to further evaluation and development of the procedure.

In 1998, Dr. U. Ulmsten reported a multicenter study of TVT for surgical treatment of stress urinary incontinence. The study was designed to evaluate the safety and efficacy of the TVT procedure. Key points of the study were:

- Prospective multicenter trial
- 6 centers
- 131 patients
- Standardized procedure
- Minimally invasive
- Local anesthesia
- Average operating time of 28 minutes
- 91% cured, 7% improved, 2% failure
- >/= 12-month follow-up
- <24 hr. hospital stay
- Minimal complications (2 hematomas which resolved spontaneously)
- No defect in healing and no tape rejection

In 1999, Ulmsten published a 3-year follow-up study on the TVT procedure. The cure rate correlated with the previous two studies revealing 86% cure rate and 11% significantly improved. There was no deterioration of results over time as had been previously seen with Burch colposuspension. Complications were minor with no defect in healing or rejection of the tape in contrast to fascial sling procedures. The low complication rate was attributed to the loose placement of the mesh with minimal dissection of the periurethral tissue. Patients were found to have minimal pain when compared to standard procedures such as Burch, colposuspension and fascial slings. The procedure was rapidly accepted in Europe and quickly moved to the United States. After 5 years, it became the primary procedure performed in the United Kingdom.

TVT was introduced in the United States by Ethicon in 1998 after receiving 510K clearance by the FDA. The procedure gained rapid popularity among gynecologists and

urologists due to the ease of performing the procedure. It has a low complication rate, and success rate which equated or exceeded that of pubovaginal sling and Burch colposuspension.

The TVT procedure described by Huntsmen offered advantages to the surgeon and the patient. While the Burch colposuspension and pubovaginal sling required general anesthesia, large incision or multiple incisions, multiple day hospital stay, the TVT procedure could be performed under local anesthesia and IV sedation, allowed same day discharge, rapid return to normal activities and low complication rates as well as high success rates. Patients no longer required routine catheters postoperatively and were discharged home on the day of surgery voiding spontaneously.

The procedure was designed to reinforce the pubourethral ligament. In addition, it provided a secure fixation of the midurethra to the pubic bone and reinforced the suburethral hammock and its connection to the pubococcygeus muscles. A polypropylene tape was used with local anesthesia placed suprapubically as well as intravaginally. Two 1 cm. incisions were placed in the abdominal wall and a 1.5 cm. incision at the midurethra. Minimal bilateral periurethral dissection was performed. The needle was placed through the urogenital diaphragm, through the retropubic space and rectus fascia on the right and the left. The mesh was laid flat beneath the midurethra with no tension on the urethra. The tape was adjusted to ensure no tension. A cough stress test was performed to tighten the mesh just tight enough to prevent leakage with cough. A cystoscopic examination was performed to ensure no injury to the bladder or the urethra. The plastic sheath was removed and excess tape removed and the vagina and skin were closed with absorbable suture. The patient was generally able to be discharged home within 1-2 hours.

Complications with TVT were found to be significantly lower than Burch colposuspension and pubovaginal sling, which were the other surgical procedures performed during this period of time. The complications seen with the TVT procedure were:

1. Injury to the bladder and urethra with trocar, occurring in 1-6% of patients. This was easily managed by removing and repositioning the trocar. The injury generally required no further treatment other than 24-hour drainage of the bladder with a catheter. Spontaneous healing resulted and no long term affects were seen.

2. Urinary retention, which was very low compared to other procedures. The majority were able to be handled with short term catheter use. The rare case of long term retention was managed by incising the mesh and relieving the obstruction. This was generally done in the office under local anesthesia and the patient was able to void normally immediately following the procedure. Retained continence was observed in a significant number of women following incising the mesh.

3. Mesh exposure occurring in 1-2% of the patients. This was generally small and did not involve infection and was handled by trimming the exposed mesh in the office under local anesthesia.

4. Pelvic pain and sexual dysfunction, which can occur following any surgical procedure for SUI and vaginal surgery, were rarely reported in the literature. Dyspareunia was generally due to mesh exposure and was found by the male

sexual miner as it was felt during intercourse. The mesh was easily removed under local anesthesia in the office.

5. Voiding dysfunction. Development of either obstructive symptoms or de novo urge incontinence has been lower with TVT than all other incontinence operations.

6. Placement of mesh within the bladder or urethra generally occurred when the mesh was inadvertently placed in the urethra or the bladder at the time of surgical placement. There is no evidence in the literature that the mesh erodes into the bladder or urethra.

Since 2000, the TVT procedure has been rapidly accepted and has become the gold standard for treatment of stress urinary incontinence (Petros 2015). More research studies have been performed on TVT than any other device in use today, or any other procedure that has been used to treat urinary incontinence for the last 100 years. There are more than 100 randomized controlled trials on TVT and close to 2,000 studies. Due to the ease of performing the procedure, the low complication rate and the high success rate, TVT and TVT-O (TVT obturator approach) have become my procedure of choice for the treatment of stress urinary incontinence.

The transobturator mid urethral sling (TMUS) was introduced in 2001 by Delorme et al. The procedure was a minimally invasive procedure to reinforce the structure supporting the urethra. It was developed as a modification of the TVT procedure which enabled the surgeon to avoid the retropubic space. It was designed to reduce injury to the internal organs i.e., the bladder, intestine and major vessels and nerves. The procedure was modified in 2003 by Leval to allow the insertion of the TOT tape in the inside-out technique using the same mesh used in the TVT procedure. The tape used the same monofilament macroporous knitted, polypropylene mesh with a pore size> 75 um. There are two approaches to the obturator procedure. The TVT-O procedure uses an insertion technique where the tape is inserted from inside the vagina to the outside while the monarch procedure introduces from the outside of the vagina to the inside.

The two methods of performing the transobturator midurethral sling (TMUS) procedure differ on the direction of trocar passage, inside-out or outside-in to place the tape in the vagina. The differences between the two TMUS methods include the size of the vaginal incision, the amount of periurethral dissection, the location of the trocar from the obturator neurovascular bundle as it passes through the obturator foramen. While there are theoretical concerns about the potential effects these difference may have on efficacy and safety of the TMUS procedure, there is no evidence that they are clinically significant. An advantage to TVT-O and monarch obturator procedures is that no cystoscopy is required postoperatively. In addition, the procedure may be carried out under local, regional or general anesthesia and has a similar recovery to TVT. The TVT-O procedure is performed by making a 1 cm. incision at the midurethra and dissecting toward the pubic bones. A guide is placed and a helical needle is inserted along the guide protecting the bladder. The needle is passed through the obturator foramen and out the lateral thigh. This is done bilaterally and the tape is pulled in place beneath the urethra. Tensioning of the tape is performed as it was in a similar fashion to the TVT ensuring there is no tension on the tape or the urethra. Excess tape is removed at the skin and the plastic sheath is removed and incisions are closed. The monarch procedure is performed by making 2 small stab incisions along the medial edge of the obturator foramen at the base of the adductor longus tendon

attachment, approximately at the level of the clitoris. An incision is made in the vagina at the midurethra and dissection carried laterally, first on the right and then on the left. Needles are passed from the skin into the vaginal incisions and the tape is attached to the needles, which are then retracted pulling the mesh into position. The tape is laid flat beneath the midurethra with no tension on the urethra or the tape. The tensioning of the tape is performed in a similar fashion as to that described previously by TVT.

In 2006, J.L. Lynn published findings on 100 consecutive women undergoing a TVT-O procedure. Mean follow-up is 18.5 months. Objective success rate was 95% with subjective success rates of 92% and 84% at 6-12 months. Complication rates were low with 2% voiding difficulty, 3% persistent groin discomfort, 1% hematoma and 1% vaginal tape erosion at de novo urge incontinence was 4.1% at 6 months and 4.8% at 12 months, which was lower than historic treatments for stress urinary incontinence. The conclusion was TVT-O was a safe and effective treatment for female stress urinary incontinence.

In 2003, the Austrian registry was created by Tamaseno et al to voluntary collect date on the perioperative course of transobturator tape procedures for stress incontinence. Data was collected on 2,543 operations with two different tape systems. Intraoperative complications were noted in< 5% of these procedures. The most common intraoperative complication was increased bleeding with the rate of 3.3%. This was higher than previously reported incidence of bleeding with TVT. The rate of bladder/urethral perforation was .5%, which is significantly lower than the incidence reported with TVT in large series of approximately 2.7% to 3.8%. The majority of the perforations occurred with the outside-in technique. This agreed with the majority of the literature which reported the inside-out technique having a lower incidence of bladder perforation. The rate of bladder perforation, hematoma and large vessel injury and bowel injury appeared to be lower than with the retropubic TVT. However, the rate of erosion/abscesses seem to be higher with the transobturator system, although the incidence was low. In 2012, Serati et al. published an article on TVT-O for the treatment of pure urodynamic stress incontinence. This was a prospective observational study conducted in four tertiary references centers. The five year subjective and objective cure rates were 90.2% and 90.8% respectively. De novo overactive bladder was reported in 24.3% of the patients at 5-year follow-up. A low rate of adverse effects was found with 5.8% of women reporting early postoperative voiding dysfunction, but only 1 case required mesh sling revision. 1.6% women developed de novo recurrent UTI. There was a 1% vaginal erosion rate at 12 months. Nineteen (9.9%) patients complained of groin pain 24 hours after surgery. One month after surgery 6 (3.1%) women complained of groin pain and this symptom remained in 2 patients after one year. At the five-year follow-up, no cases of groin pain remained.

The major professional organizations in urology and urogynecology have put out position statements with regard to mesh midurethral slings. I am currently a member of AUGS and associated with these organizations and agree with their statements.

1. AUGS (The American Urogynecology Society)
2. SUFU (The Society for Urodynamics Female Pelvic Medicine in Urogenital Reconstruction)
3. AUA (The American Urological Association)

4. NICE (National Institute for Health Care Excellence)

The American Urogynecology Society was founded in 1979 as the premier nonprofit organization representing more than 1700 members including practicing physicians, nurse practitioners, physical therapist, nurses and health care professionals, as well as researchers from many disciplines, all dedicated to treating female pelvic floor disorders (pelvic organ prolapse and urinary incontinence). As a leader in female pelvic medicine and pelvic reconstructive surgery, AUGS promotes the highest quality of patient care through excellence in education, research and advocacy.

SUFU, The Society of Urodynamic, Female Pelvic Medicine and Urogenital Reconstruction is the nonprofit organization dedicated to improve the art and science of urology through basic and applied clinical research in urodynamics and neurourology, voiding function and dysfunction, female urology and pelvic floor dysfunction and disseminate and teach these concepts. It is the oldest professional organization dedicated to field consisting of interested physicians, basic scientists, and other health care professionals, and has grown to over 500 members.

In 2013, AUGS issued a position statement regarding restriction of surgical options for pelvic floor disorders. Within the statement, AUGS position was that any restriction of the mesh slings for the treatment of stress urinary incontinence was clearly not supported by any professional organization or the FDA. The statement was justified by the fact that full length synthetic midurethral slings were excluded from the FDA mandated post-marketing studies to evaluate the safety and effectiveness of vaginal mesh. In a study by Nager, et al. 53 expert urologist and urogynecologists (> 90% were fellowship trained) and who could select among many surgical options, the full length synthetic midurethral sling was the preferred option in 93% of the surgical treatment of primary stress incontinence. I was an investigator in this study. AUGS went on to state that midurethral slings, both retropubic and transobturator, have been extensively studied, and are safe and effective relative to other treatment options and remain the leading treatment option and current gold standard of care for stress incontinence surgery.

The AUA (The American Urology Association) issued a position statement on the use of vaginal mesh for the surgical treatment of stress urinary incontinence in 2013. The suburethral synthetic polypropylene mesh sling placement is the most common surgical procedure performed. This was based on extensive data in the literature for the use of synthetic polypropylene mesh for suburethral slings in treating SUI. The data reveals minimal morbidity when compared to alternative surgeries. Advantages include shorter operative time/anesthetic need, reduced surgical pain, reduced hospitalization, and reduced voiding dysfunction. Mesh related complications may occur with polypropylene sling placement, but the rate of these complications is acceptably low. In addition, many sling related complications are not unique to mesh surgeries and are known to occur with non-mesh sling procedures as well. It is important to recognize that many sling related complications are not unique to mesh surgeries and are known to occur with non-mesh sling procedures as well. It is the AUA's opinion that any restriction of the use of synthetic polypropylene mesh suburethral slings would be a disservice to women who choose surgical correction of SUI. This statement is in agreement with the AUGS as well as SUFU.

The AUA based their statement on multiple case series and randomized controlled trials that illustrated the efficacy of synthetic polypropylene mesh slings at 5 and 10 years. The efficacy was found to be equivalent or superior to other surgical techniques. There was no significant increase in adverse events observed with this period of follow-up. The AUA guidelines for the surgical management of stress urinary incontinence (2009) concluded that synthetic slings are an appropriate treatment of choice for women with stress incontinence. It has similar efficacy, but less morbidity than conventional non-mesh slings.

The National Institute for Health and Care Excellence (NICE) issued a clinical guideline in September 2013, regarding the management of urinary incontinence in women. Their recommendations were based on the best available medical and scientific literature. NICE recommendations for treatment of stress urinary incontinence include the midurethral tape procedure and they recommend use of procedures and devices for which there is high quality evidence of efficacy and safety, fully trained surgeons and use of Type I Macroporous polypropylene tape. TVT meets all of these recommendations and is the first tape brought to market with the highest quality evidenced based research on the market TVT-O also meets all of these recommendations. Synthetic midurethral sling is a recommended treatment choice for stress urinary incontinence by NICE. NICE recognizes that there is more evidence based literature regarding retropubic bottom-up sling (TVT) than any other procedure on the market today. This includes historic treatments of stress urinary incontinence. On average the retropubic sling was found to have a higher continence cure rate and lower complication rates. Erosion rates were found to be < 2% from year 3 to year 10 following performance of the procedure.

In 2014, AUGS and SUFU issued a joint statement which follows: **"The polypropylene mesh midurethral sling is a recognized worldwide standard of care for the surgical treatment of stress urinary incontinence. The procedure is safe, effective and bas improved the quality of life for millions of women."** Justification for the position statement was provided jointly by both organizations.

1. Polypropylene material is safe and effective as a surgical implant.

    - It has been used in surgical subspecialties for> 5 decades. This includes general surgery, cardiovascular, transplant, ophthalmology, otolaryngology, gynecology and urology. Successfully used in millions of patients.

    - Long term durability, safety and efficacy have been demonstrated up to 17 years. The best implant for surgical treatment for SUI is macroporous, monofilament and light weight polypropylene. Specifically, type 1 mesh is universally recognized as possessing the highest biocompatibility with the least propensity for infection. (Ford Cochrane Review 2015).

2. Monofilament polypropylene mesh (MUS) is the most extensively studied anti¬ incontinence procedure in history.

    - There are > 2000 publications in the scientific literature describing MUS as treatment of SUI.

- Includes the highest level of scientific evidence in peer reviewed scientific literature.

- MUS is studied in all types of patients with and without comorbidities in all types of SUI.

- Multiple randomized control trials comparing MUS to other MUS procedures and other established non-mesh SUI procedures consistently demonstrates this clinical effectiveness in patient satisfaction.

- More extensive investigation has been performed on MUS than any other surgical treatment for SUI.

- It's studied in follow-up after implantation as long as any other procedure and demonstrates safety and efficacy.

3. Polypropylene mesh midurethral slings are the standard of care for the surgical treatment for SUI and represents a great advance in the treatment for this condition for our patients.

   - Numerous Level I randomized comparative trials demonstrating safety and efficacy.

   - MUS is the most common surgical procedure for treatment of SUI in the U.S. and the developed world.

   - It has replaced open and transvaginal suspension surgeries for uncomplicated SUI.

   - There are over 100 surgical procedures developed for the management of SUI and now there is evidence that MUS is associated with less pain, shorter hospitalization, faster return to usual activities and reduced cost as compared to historic options that have been used to treat SUI over the past century.

   - Full length midurethral slings both retropubic and transobturator have been extensively studied and are safe and effective relative to other treatment options, and remain the leading treatment option and comment gold standard for stress incontinence surgery.

   - Over 3 million midurethral slings have been placed worldwide and a recent survey indicates that these procedures are used by > 99% of AUGS members.

4. The FDA has clearly stated that polypropylene MUS is safe and effective in the treatment of SUI.

- The midurethral sling was not the subject of the 20 II FDA safety communication, "Urogynecologic surgical mesh: update on the safety and effectiveness of vaginal placement for pelvic organ prolapse." It was explicitly stated in this document that, "The FDA continues to evaluate the effects of using surgical mesh for the treatment of SUI and will report about that usage at a later date."

- In 2013, the FDA website stated clearly that, "The safety and effectiveness of multi-incision slings is well established in clinical trials that followed patients for up to one year." This statement was approved by the AUGS Board of Directors and the SUFU Board of Directors on 1/3/14.

Most recently, ACOG and AUGS conducted a systematic review of the medical literature and issued Practice Bulletin No. 155 Urinary Incontinence in Women (American College of Obstetricians and Gynecologists. Obstet Gynecol 2015; 126:e66–81), which sets forth the following conclusions and recommendations based on good and consistent (Level A) evidence:

- Initial midurethral sling surgery results in higher 1-year subjective and objective cure rates than pelvic floor physical therapy in women with stress urinary incontinence.

- Synthetic midurethral slings demonstrate efficacy that is similar to traditional suburethral fascial slings, open colposuspension, and laparoscopic colposuspension. Compared with suburethral fascial slings, fewer adverse events have been reported with synthetic midurethral slings. Voiding dysfunction is more common with open colposuspension than with synthetic midurethral slings.

- There are substantial safety and efficacy data that support the role of synthetic mesh midurethral slings as a primary surgical treatment option for stress urinary incontinence in women.

Summary of literature for midurethral sling using monofilament polypropylene mesh:

Midurethral slings like TVT and TVT-O are the standard of care for the surgical management of urinary stress incontinence.[1] Like the TVT, long term data continues to support the use of TVTO with proven safety and efficacy.[2] There are more long term studies with follow up of up to 17 years

[1] Schimpf MO, Rahn DD, Wheeler TL, Patel M, White AB, Orejuela FJ, El-Nashar SA, Margulies RU, Gleason JL, Aschkenazi SO, Mamik MM, Ward RM, Balk EM, Sung VW; Society of Gynecologic Surgeons Systematic Review Group. Sling surgery for stress urinary incontinence in women: a systematic review and metaanalysis. Am J Obstet Gynecol. 2014 Jul; 211(1):71.e1-71.

[2] Tommaselli GA, Di Carlo C, Formisano C, Fabozzi A, Nappi C. Medium-term and long-term outcomes following placement of midurethral slings for stress urinary incontinence: a systematic review and metaanalysis. Int Urogynecol J. 2015 May 20. [Epub ahead of print]; Athanasiou S, Grigoriadis T, Zacharakis D, Skampardonis N, Lourantou D, Antsaklis A. Seven years of objective and subjective outcomes of transobturator (TVTO) vaginal tape: why do tapes fail? Int Urogynecol J. 2014 Feb; 25(2):219-25. doi: 10.1007/s00192-013-2186-8; Laurikainen E,

with the TVT that document its efficacy, with continence cure and improvement in the 80-90% range, and safer than any other surgery (Liapis et al, 2008; Nilsson et al, 2008, 2013; Olsson et al, 2010; Groutz et al, 2011; Heinonen et al, 2012; Serati et al, 2012; Svenningsen et al, 2013; Laurikainen et al, 2014; Tommaselli et al, 2015).

There is a broad base of evidence supporting the use of mid urethral sling as treatment for stress urinary incontinence. There are over 2,000 publications in the scientific literature describing midurethral sling in the treatment of SUI and this includes the highest level of scientific evidence in peer reviewed scientific literature (Novara et al, 2007; AUGS-SUFU Position Statement on Mesh Midurethral Slings for SUI 2014; Ford Cochrane Review 2015) The procedure has been studied in all types of patients with and without morbidities and in all types of SUI. There are multiple randomized controlled trials comparing types of midurethral sling procedures as well as comparing midurethral sling procedures to other established non-mesh treatments for SUI. Interestingly among historical stress urinary incontinence procedures the MUS has studies with the longest follow-up following implantation, which has consistently demonstrated superior safety and efficacy. No other historical procedure has as many scientific papers regarding its use as the MUS. By all accounts, it is the most extensively studied surgical treatment for stress urinary incontinence in the last 100 years, and this includes all prior surgical procedures for SUI. The available surgical data as well as the universal agreement of professional organizations involved in the evaluation and treatment of stress urinary incontinence have led me to offer the TVT procedure as my primary treatment of choice for stress urinary incontinence.

At the present time, expert opinion and clinical practice guidelines from a wide group of subspecialty societies, such as the American Urogynecologic Society, American Urological Association, Society of Gynecologic Surgeons, Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction and the International Urogynecological Association advocate the mid-urethral sling as the standard of care for the surgical treatment of SUI and acknowledge that it represents a great advance in the treatment of this condition in women (AUA Position Statement on the Use of Vaginal Mesh for the Surgical Treatment of Stress Urinary Incontinence Oct. 2013; IUGA Position Statement on Mid-Urethral Slings for Stress Urinary Incontinence July 2014; Schimpf et al A systematic review and meta-analysis and SGS Recommendations 2014; AUGS-SUFU Position Statement on Mesh Midurethral Slings for SUI 2014).

Progression of Studies Establishing Safety & Efficacy of TVT and TVT-O:

In 2000, the National Institute of Diabetes, Digestive and Kidney Disease (NIDVK) established the Multicenter Urinary Incontinence Treatment Network (UITN) to conduct randomized clinical trials of the most common treatments for women with urinary incontinence. The first trial was to compare the efficacy of the Burch colposuspension and the autologous rectus fascial sling. Amazingly, it was the first large randomized clinical trial to compare these two procedures directly as the sling had been performed for 100 years and the Burch

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Valpas A, Aukee P, Kivelä A, Rinne K, Takala T, Nilsson CG. Five-year results of a randomized trial comparing retropubic and transobturator midurethral slings for stress incontinence.

colposuspension for 50 years. At 24 months, the pubovaginal sling had significantly higher rates of success for the treatment of stress incontinence when compared to Burch colposuspension. Overall success rate of 66% versus 49% for the Burch colposuspension. In addition, the sling group had a higher satisfaction rate than did the Burch group. The higher success rates in the sling group were offset by higher rates of urinary tract infection, urge incontinence, voiding dysfunction, and the need for surgical revision to improve voiding.

The second randomized trial of the UITN was retropubic versus transobturator midurethral slings for stress incontinence. A total of 597 women were randomly assigned to the study group and success rates for treatment determined at 12 months. The unadjusted rates of treatment success with the retropubic and transobturator procedures according to objective criteria met the predefined criteria for equivalence (80.8% in the retropubic sling group and 77.7% in the transobturator sling group). A review of the Cochran data base in 2009 by Ogah revealed the success rate of 84% with transobturator and 88% with the retropubic sling. Two meta-analyses by Novara and Latthe revealed higher success rates with 86% to 99% for the retropubic sling and 84% to 98% with the transobturator sling.

Adverse events in the TOMUS trial (trial of midurethral sling) were subsequently reported by Brubaker. The most common adverse events in the TVT group were bladder perforation 5%, mesh exposure 3%, vaginal epithelium perforation at the time of surgery 2%, and bladder dysfunction requiring surge1y and/or catheterization 3%. The most common complications with TOT were vaginal epithelial perforation and neurologic symptoms, which resolved within 6 weeks of surgery.

Albo et al. subsequently reported on TOMUS trial success rates of the retropubic and transobturator midurethral sling at 24 months. Objective success rates for the retropubic and transobturator midurethral sling was 77.3% and 72.3% respectively. Subjective success rates were 55.7% and 48.3% respectively. Patient satisfaction results were high with retropubic at 86.3% versus 88.1% for transobturator. Adverse events were also addressed and the frequency of de novo urgency incontinence was extremely low with retropubic at 0% versus transobturator at .3%. Recurrence of mesh exposure with retropubic 4.4% versus transobturator 2.7%. The findings of the TOMUS trial were consistent with other studies in the literature. Ghezzi, et al. reported on sexual function following placement of tension free vaginal tape in a prospective study in 2005. His findings indicated that sexual function improves or is unaffected for most women with pure stress urinary incontinence after the TVT procedure.

In 2012, Zyczynski, et al. performed a secondary analysis looking at sexual function of women who were enrolled in the trial of midurethral slings (TOMUS) study 2 years after their surgical procedure was performed. Sexual function was assessed with the Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ-12). The findings included sexual function significantly increased over the first 2 years as reported on the PISQ-12. There was no decrease in the proportion of women who reported sexual activity during these 2 years and sexually active women reported less dyspareunia. Improvements in sexual function were similar after surgery by either the retropubic or the transobturator route. Neither synthetic mesh or sling route was associated with increased dyspareunia. These findings were consistent with the Stress Incontinence Surgical Treatment Efficacy Trial (SISTEr) which compared fascial sling and

Burch urethropexy which also detected a significant reduction in pain during sexual activity. The SISTEr trial and the TOMUS trial were both conducted by the Urinary Incontinence Treatment Network sponsored by the NIH.

In 2013, Nilsson published the results of a study evaluating the long term effect of synthetic tape and to assess the continent status 17 years after surgery. This is the longest follow-up of the performance of tension free vaginal tape in the literature. The objective cure rate by stress test was 91% and showed no decline between 5 and 17 years. The corresponding subject of perception of either cure or improvement was over 87% with a slight decline during the last 6 years. Tradition specific quality of life questionnaires were evaluated at 5, 7, 11 and 17 years. The percentage cured or improved ranged from 95% at 5 years to 87% at 17 years revealing long term global satisfaction. Remarkably in this trial of the 90 patients followed, there was only one complication from the tape which was asymptomatic erosion. An important observation at this study was that there seemed to be no shrinkage of TVT mesh over time as suggested by PVR volumes within normal ranges except for 2 patients with concomitant disease (Parkinson's and Grade III cystocele).

The recent systematic review conducted and published by the Society for Gynecologic Surgeons Systematic Review Group (Schimpf et al, 2014) reported that mid-urethral slings results in lower rates of perioperative adverse events such as blood loss, postoperative pain, operating room time, hospital stay, bowel injury, DVT, wound infections and hematomas compared to the Burch procedure. This recommendation was based upon level 1C evidence. Comparing absolute complication rates between pubovaginal slings and the retropubic TVT sling, the TVT sling resulted in lower rates of operating room time, blood loss, transfusion, wound infection, retention, OAB symptoms, DVT, and hospital stay, whereas pubovaginal slings had lower rates of urinary tract infection and vaginal perforation. A metaanalysis of adverse event information showed no significant difference in return to the OR for sling erosion, but favored the mid-urethral sling for better subjective cure.

Despite concerns that mid-urethral sling procedures can be anticipated to result in significant number of complications that would require surgical revision, the probability of surgical re-intervention has already been well studied. Data from numerous studies, including national and regional closed systems like the Kaiser Permanente HealthConnect Clarity database has consistently demonstrated low rates of perioperative complications and reoperation rates. Several well conducted studies and meta-analyses of different designs show that the need to reoperate for sling revision / removal following a TVT occurs in about 2.5 - 3.5% of patients studied out to 10 years. (Welk et al JAMA Surg 2015; Unger et al IUJ 2015; Schimpf et al, 2014; Laurikainen et al 2014; Jonsson Funk et al, 2013; Svenningsen et al, 2013; Nguyen et al, 2012; Ogah et al, 2009; Novara et al 2008).

Unger et al found a 2.7% rate of surgical intervention in 3,307 women who underwent sling placement with a median time from the index to the revision surgery of 7.8 months (IUJ 2015). Voiding symptoms and urinary retention were the most commonly reported indications for revision, followed by mesh erosion. Very few (0.2%, 7/3,307) had pain/dyspareunia as a reason for intervention. The type of sling was not associated with the need or indication for revision. Approximately 70 % of patients in this study reported either partial or complete

improvement of their symptoms after revision surgery. All patients who had undergone revision for pain symptoms of had either partial or complete improvement.

In a recent study that analyzed 59,887 patients who received a synthetic sling for SUI, 2.2% of patients underwent operative intervention for mesh complications and the overall 10-year cumulative rate of complications was also low, at about 3% (Welk et al JAMA Surg 2015). These results are consistent with the above. The authors also observed that the majority of reinterventions occurred in the first year, which is also consistent with Jonsson Funk et al, Nguyen et al, Unger et al, and my clinical experience. These interventions are mostly due to sling placement and voiding difficulties.

Case reports and case series cited by plaintiffs' experts like the paper by Abbott et al 2014 are deficient in numerous respects, biased, of limited evidence value and do not have a denominator thus they cannot be said to apply to the general population of TVT users or patients ("Perhaps most importantly, there is no denominator for the total number of patients who underwent an SUI or POP procedure with synthetic mesh. Thus, we can make no comments about the rate at which such complications occur."). Even in that case series of 347 patients who sought care for complications, it was reported that less than half of the sling only cohort, 23.3%, underwent two or more reintervention surgeries. Thus the need for multiple reintervention surgeries was not more likely than not even in this biased and confounded cohort. It was also observed that those women with complications after a sling-only procedure were treated more often with medical treatment first and rarely required surgical reintervention. These data do not support the claims that TVT places a woman at a significant risk of long term, chronic complications or the need for reoperation as plaintiffs' experts suggest.

Overall, the data from these high quality long term registries do not support the claims that TVT places a woman at a significant risk of long term, chronic complications or the need for reoperation as plaintiffs' experts suggest.

Gynecare TVT and TVT-O Instructions For Use (IFU):

I am a urogynecologist who performs surgery for urinary incontinence. Two of the procedures that I perform are TVT and TVT-O. Each one comes in its own mesh kit. Each kit contains instructions for use, which are written by the medical affairs group at Ethicon to provide detailed instructions regarding the use of the products. The instructions should be read by each physician prior to performing these techniques for treatment of urinary incontinence. The IFU should identify the indications for using the device, describe the procedural steps, identify any contraindications, warnings and adverse events associated with the device, as well as other details associated with the use of the kit. I have read the instructions for use in my own practice and have trained physicians both locally and nationally in the use of TVT and TVT-O following the instructions that accompany the devices. The IFU properly indicates what the devices are to be used for and correctly and accurately identifies the steps for implanting the TVT and TVT-O. The contraindications are clearly pointed out in the instructions. The warnings and adverse events are accurate. Ethicon does not attempt to dictate what patients are appropriate for the TVT and TVT-O devices. If a patient falls within the indications for the surgery and there are no contraindications to performing the TVT or TVT-O, then the physician may proceed with the

technique. The physician must use his knowledge and diagnostic skills to evaluate each patient and determine if TVT or TVT-O is an appropriate treatment for each patient.

Because all of the cases in Wave II and the Consolidated cases (Mullins) involve implantations prior to October 2015, I will confine my discussions to the pre-2015 IFU except where specifically noted.

The IFU for both TVT and TVT-O states that failure to follow the instructions may result in improper functioning of the device and lead to injury. The Company clearly states in the IFUs for both TVT and TVT-O that the product IFU is not a comprehensive reference to surgical technique for correcting stress urinary incontinence. In addition, the IFUs statute that the devices should only be used by physicians trained in the surgical treatment of stress urinary incontinence and specifically in implanting the Gynecare TVT/TVT-O device. They recommend that all information in the booklet should be reviewed prior to performing this procedure.

The IFU for each product contains a detailed description of the parts of the TVT or TVT-O kit. The TVT device is described as a sterile single-use device consisting of one piece of undyed or blue polypropylene mesh tape. It is approximately ½" wide and 18" long and covered by a plastic sheath, which is cut and overlapping in the middle. It is held between 2 stainless steel needles bonded to the mesh in plastic sheath with plastic collars. The Prolene mesh used is constructed with knitted filaments of extruded polypropylene strands which are identical in composition to that used in Prolene polypropylene nonabsorbable surgical sutures. The mesh is approximately .027" (.7mm.) thick. This material when used as a suture has been reported to be nonreactive and to retain its strength indefinitely in clinical use. Prolene mesh is knitted by a process which interlinks each fiber junction.

The Gynecare TVT introducer is a reusable handle that is provided in a nonsterile fashion. It is made of stainless steel and consists of two parts, a handle and an inserted threaded metal shaft. It is sterilized prior to the procedure. It is used to pass the needle attached to the tape from the vagina to the abdominal skin.

Gynecare TVT rigid catheter guide is a non-sterilizable reusable instrument intended to facilitate the identification of the urethra and bladder neck during the surgical procedure. It is inserted into bladder via the urethra using a Foley catheter, recommended size 18 French.

The TVT-O device is also described as a sterile single-use device consisting of one piece of undyed or blue polypropylene mesh tape. It is approximately ½" wide and 18" long and covered by a plastic sheath overlapping in the middle. Plastic tube receptacles are attached at each end of the tape. The Prolene mesh used in TVT-O is the same mesh used in the TVT kit, as described above. The TVT-O helical passers designed to deliver the TVT-O device are provided as left and right units, pre-assembled to the TVT-O system. The helical passers are two stainless steel, curved wire passers with plastic handles. The TVT-O atraumatic winged guide, also a stainless steel instrument, facilitates passage of the helical passers through the dissection tract.

Stated indications by the Company are that the Gynecare TVT and TVT-O devices are intended to be used as a pubourethral or sub-urethral sling, respectively, for the treatment of

stress urinary incontinence (SUI) for female urinary incontinence resulting from urethral hypermobility and/or intrinsic sphincter deficiency.

The IFU then proceeds to describe in detail the steps allowing the placement of the mesh. For the TVT device, placement of the mesh requires approximately 22 steps and 20-25 minutes operating time. The TVT-O IFU sets forth 19 steps for the placement of the mesh tape.

A properly trained and experienced physician should be able to safely and effectively implant either the TVT or the TVT-O device following the detailed directions in the IFU accompanying each device. While all the steps of the procedures are important, there are several specific steps that Ethicon discusses in the IFUs which are critical to the procedures. First the tape must be placed tension free. This means there is no tension on the tape and no tension on the urethra. This is in contrast to the Burch or MMK procedures, which elevate and fix the urethra to the symphysis pubis. It is critical that the tape be under no tension as this may cause temporary or permanent lower urinary tract obstruction which may lead to adjustment of the tape in order to resume voiding. In most cases, the patient is able to void 2-3 hours after the procedure. Occasionally, the patient may require a catheter for 1-2 days. Proper tensioning is described in the IFUs, after which a cough stress test may be performed to ensure that urine may still pass through the urethra allowing normal voiding. A second step described in the IFUs for ensuring no tension on the urethra is to put an instrument behind the implant which would be between the implant and the urethra prior to removal of the plastic sheath so that no tightening or tension of the implant on the urethra occurs.

Contraindications:

Three specific contraindications are mentioned in the IFU for both TVT and TVT-O. These are pregnant patients, patients with future growth potential and women with plans for future pregnancy. This is because there is minimal stretch in the mesh. If a patient has stress incontinence and does not have any of the contraindications described in the IFUs, then the physician must then decide if TVT or TVT-O Prolene mesh is the optimal procedure to treat her incontinence. This decision is made by evaluating the patient's incontinence as a whole, including urodynamic testing, medical and surgical history as well as other patient selection factors as determined by the physician. It is impossible to place in an IFU all of the patient selection factors that come into consideration.

Warnings and Precautions:

After reviewing this section in the IFUs for both TVT and TVT-O, it is my medical opinion that the adverse reactions identified, including the potential adverse events identified that are clearly related to the specific devices, provide me with excellent information to be aware of the possible adverse events so that the patient may be adequately counseled and able to provide an informed consent. Specific warnings identified in connection with the use of both TVT and TVT-O are:

1. Avoidance of the procedure who are on anticoagulation therapy.

2. Avoidance of patients who have urinary tract infection. This is important as it may increase the risk of pyelonephritis (kidney infection) as well as infections in the surgical site.

3. Users of the TVT device should be familiar with the surgical technique for bladder neck suspensions and adequately trained in implanting TVT. Similarly, users of the TVT-O device should be familiar with the surgical technique for urethral suspensions and should be adequately trained in the TVT-O system prior to implanting the device. This is critical as the tape should be placed in the proper location without tension.

4. Acceptable surgical practice should be followed for the Gynecare TVT or TVT-O procedure as well as for management of contaminated or infected wounds. This important to me as a physician as the tape should not be placed in infected surgical fields.

5. The procedures should be performed with care to avoid large vessels, nerves, bladder, bowel, attention to local anatomy and proper passage of needles in order to minimize risks. It is critical to me as a surgeon to be knowledgeable of pelvic anatomy allowing me to pass the needles properly to minimize injury to surrounding procedures. Nerve injuries may occur with any stress urinary incontinence procedure or any other procedure of the pelvic floor. The results of the nerve injury may be temporary or long term. This may include pain or muscle weakness. Proper passage of the trocars through the pelvic floor ensures proper placement of the mesh and this is clearly described in the IFU. This description allows the surgeon to place the mesh and needles avoiding major nerves. Nerve pain from nerve entrapment due to scar tissue is extremely unlikely. Long term nerve pain with TVT is very uncommon. Persistent nerve pain following procedures on the pelvic floor may occur with any procedures for urinary incontinence. They are generally treated with medication, nerve block injections and in cases of mesh placement, removal of the mesh. Pelvic and vaginal pain is much more likely with traditional procedures than the placement of midurethral slings in my practice.

6. Bleeding may occur postoperatively and the patient should be observed as described in the warnings. The patient should be observed for signs and symptoms prior to discharge from the hospital.

7. In the TVT IFU, Ethicon describes the rigid catheter guide and states that it should be used gently through the catheter and removed allowing the catheter to remain in place postoperatively.

8. The IFUs for both TVT and TVT-O describe the plastic sheaths and advise that the sheaths are not to be removed until the tape is properly in place with minimal tension on the midurethra. This is important to me as a physician as it allows proper positioning of the tape.

9. In the IFU accompanying the TVT device, Ethicon advised that the Prolene mesh may be used in contaminated areas, such as the vagina, with the understanding

that subsequent infection may require removal of the material. The vagina is a clean contaminated organ in the body that contains bacteria in its normal flora. This may result in an infection and patients should be observed for this postoperatively[3]. In the IFU accompanying the TVT-O device, Ethicon advised that the procedure should not be performed if the implanting surgeon thinks that the surgical site may be infected or contaminated.

10. Ethicon advised that the patient should be counseled that future pregnancies may negate the effects of the surgical procedure and incontinence may return. They go on to describe the fact that there is no clinical experience available with vaginal delivery following Gynecare TVT or TVT-O and cesarean section is recommended for delivery.

11. Postoperatively, following implantation of either TVT or TVT-O, the patient should be advised to refrain from heavy lifting and/or exercise for at least 3-4 weeks, and intercourse for 1 month. The patient can return to other normal activities after 1-2 weeks.

12. Ethicon advised in the IFUs for both TVT and TVT-O that if dysuria, bleeding or other problems occur, the patient should contact the surgeon immediately. This is standard postoperative instruction for all surgical procedures.

13. All surgical instruments are subject to wear and damage under normal use and should be carefully examined prior to any surgical procedures.

14. The IFU accompanying the TVT-O device warns that transient leg pain lasting 24-48 hours may occur and can typically be managed with mild analgesics.

15. Ethicon advised that de novo detrusor instability may occur following the Gynecare TVT or TVT-O procedure. To minimize this risk, the tape should be placed in a tension free position at the midurethra. All surgical procedures for stress urinary incontinence may result in de novo urgency and urge incontinence. The literature is clear that this is more prevalent following the Burch colposuspension as well as other types of suburethral slings, including the use of autologous fascia.

16. Ethicon advises that the Prolene mesh in the TVT and TVT-O kits must not contact any staples, clips or clamps, as such contact may cause mechanical damage to the mesh resulting in less successful outcome.

17. Lastly Ethicon advises that the tape in the TVT and TVT-O kits should never be resterilized for reuse. Any opened, unused device should be discarded.

[3] Importantly, contamination does not equate to infection. Concerns that bacteria adhere to the TVT tape during implantation and lead to clinical infection is not supported by the broad base of high quality scientific papers on the worldwide TVT experience. (Ford Cochrane Review 2015) Even a study by one of plaintiffs' experts does not support this concern, as Klinge et al also reported in a rat model, that in vitro bacterial adherence occurs significantly less frequently with monofilament mesh compared to multifilament mesh and that the persistence of bacteria did not lead to a clinically higher rate of infection (Klinge 2002).

The IFU then describes adverse reactions that may occur with the TVT and TVT-O Prolene mesh procedures.

1. Punctures or lacerations of vessels, nerves, bladder or bowel may occur during needle passage and may require surgical repair. The TVT-O IFU also warns about the possibility of punctures or lacerations to the urethra. These are complications that may occur with any surgical procedure to the pelvic floor as well as with the TVT or TVT-O device.

2. Transitory local irritation at the wound site and transitory foreign body response may occur. This response could result in extrusion, erosion, fistula formation and inflammation. These are complications that as a practitioner, I would see with any implant placed in the body. They are however, very rare.

3. As with all foreign bodies, Prolene mesh may potentiate an existing infection. Ethicon describes and placed a plastic sheath over the Prolene mesh to minimize the risk of contamination. This ensures that the mesh is covered as it is passed through the vagina and the plastic sheath cover is not removed until it is placed at the midurethra outside the vaginal canal.

4. Over correction, i.e., too much tension applied to the tape may cause temporary or permanent lower urinary tract obstruction. All surgical procedures for stress urinary incontinence are designed to elevate and support the urethra. The TVT and TVT-O devices supports this at the midurethra with no tension. Other procedures such as the Burch colposuspension and autologous fascial slings are designed to place more tension on the urethra reducing stress urinary incontinence.

Following the adverse reactions section of the TVT and TVT-O IFUs, there is a section called "actions." In this section, Ethicon reports that animal studies have shown minimal inflammatory reaction in tissues and stimulates the deposition of a thin fibrous layer of tissue that can grow through the interstices of the mesh, that is incorporating the mesh into adjacent tissue. This is important to me as there will be no persistent or acute inflammatory response affecting the vagina and bladder in the patient. This is consistent with what I have seen in my practice and in the literature. I have seen no persistent inflammatory responses that have clinically affected any of my patients. Ethicon also states that the mesh is not subject to degradation, meaning that it is a permanent mesh and will not change in character over time. I have used Prolene sutures for more than 30 years and Prolene mesh for more than 20 years. During that time, I have never had a failure due to degradation, i.e., a failure caused by the suture or mesh losing its mechanical integrity. In my opinion, Prolene does not degrade. And even if a small outer (1-5 micron) layer were to degrade as argued by some of the Plaintiffs' experts in these cases—that fact would have no clinical significance. Additionally, I am aware of no important literature and certainly no metaanalysis showing that the alleged degradation of Prolene harms patients. Finally, I note that Prolene sutures have been on the market for more than forty years and if degradation were a problem, it is my opinion that we would have determined that fact long ago. In fact, our clinical experience and the good results obtained with Prolene sutures and Prolene mesh in millions of patients proves otherwise. It has been used in

surgical subspecialties for more than five decades. This includes general surgery, cardiovascular, transplant, ophthalmology, otolaryngology, gynecology and urology.

In my experience and review of the available medical literature, serious complications of TVT and TVT-O are very uncommon. The major intraoperative complications are very rare for midurethral slings like TVT and TVT-O. Bladder injuries are much less common with TVT-O and transient leg pain may occur lasting 24-48 hours and generally resolves with no long term effect. These findings were confirmed with the TOMUS trial performed by the UITN

There is no procedure or device that has a better benefit risk ratio than the midurethral slings for SUI. As such, it developed into the gold standard procedure for treatment of SUI 5-6 years after introduction and has remained the gold standard procedure to this day.

2015 TVT and TVT-O IFU Change:

In 2015, Ethicon added several adverse reactions to the TVT IFU. These additions include the following:

- Punctures or lacerations of vessels, nerves, structures or organs, including the bladder, urethra or bowel, may occur and may require surgical repair.
- Transitory local irritation at the wound site may occur.
- As with any implant, a foreign body response may occur. This response could result in extrusion, erosion, exposure, fistula formation and/or inflammation.
- Mesh extrusion, exposure, or erosion into the vagina or other structures or organs.
- As with all surgical procedures, there is a risk of infection. As with all foreign bodies, Prolene Mesh may potentiate an existing infection.
- Over correction, i.e., too much tension applied to the tape may cause temporary or permanent lower urinary tract obstruction.
- Acute and/or chronic pain.
- Voiding dysfunction.
- Pain with intercourse which in some patients may not resolve.
- Neuromuscular problems, including acute and/or chronic pain in the groin, thigh, leg, pelvic and/or abdominal area may occur.
- Recurrence of incontinence.
- Bleeding including hemorrhage, or hematoma.
- One or more revision surgeries may be necessary to treat these adverse reactions.

- Prolene Mesh is a permanent implant that integrates into the tissue. In cases in which the Prolene Mesh needs to be removed in part or whole, significant dissection may be required.
- Seroma.
- Urge incontinence.
- Urinary frequency.
- Urinary retention.
- Adhesion formation.
- Atypical vaginal discharge.
- Exposed mesh may cause pain or discomfort to the patient's partner during intercourse.
- Death.

It is my opinion that these risks are general surgical risks of all pelvic floor surgeries, including any surgery to treat SUI. These general surgical risks are commonly known to experienced pelvic floor surgeons who are the intended users of the IFU. Only mesh erosion or exposure is unique to TVT and that has always been in the TVT and TVT-O IFU.

TVT and TVT-O Brochures:

Ethicon has developed patient brochures which describe in layman's terms symptoms of stress urinary incontinence. It also tells patients why stress urinary incontinence may occur and possible treatment options. The brochure contains nonsurgical options as well as the surgical option of TVT or TVT-O. The risks of the procedure are described in the brochure. Ethicon emphasizes in the brochure that it is informational and that the symptoms as well as the treatment should be discussed with your physician to determine if you are a candidate for this type of treatment. The brochure is informational in nature and meant to prompt the patient to discuss treatment options with her physician for the symptoms of stress urinary incontinence. It is not intended to fully inform the patient of indications for the procedure or every risk or benefit of the procedure. Informed consent for surgical procedures is provided by the physician prior to performing any procedure and the patient must sign a consent which meets the standard guidelines for informed consent. This would include the name of the procedure, the reason for performing the procedure, the success and failure rates as well as any potential adverse outcomes or specific risks of the procedure.

Professional Education:

Professional education programs regarding the TVT devices are not required by the FDA. Ethicon provides professional education to aid in the safe and effective use of its products.

Ethicon professional education has been very successful and provides a tremendous opportunity for physicians to be trained. Ethicon meets and often exceeds the industry standard for education on sling products. Ethicon further encourages physicians by underwriting the cost of physician education.

Ethicon provides multiple different training opportunities. Didactic courses are organized by Ethicon to discuss the procedure in detail, patient selection, clinical data, complications and management of complications. These sessions are chaired by practicing physicians that are experts on the use of the products and have been vetted and trained by Ethicon for on label, ethical use of the products. Ethicon also provides the physicians with the opportunity to practice skill sets in a cadaver lab setting and participate in either preceptorship or proctorship settings. Preceptorship is a form of education where physicians being trained are able to watch expert physicians perform the surgery. The proctorship is a form of training where the trainee performs the surgical procedure and the expert physician trainer observes and instructs the trainee during the operation. Ethicon also provides inanimate models allowing the physician to practice the procedure prior to performing the procedure. Inanimate trainers are available free of charge from Ethicon allowing the physician unlimited practice. I began performing TVT midurethral slings in the 1990's. Prior to performing my first TVT, I participated in a didactic course and a cadaver lab. The course included both the didactic section and a cadaver lab. The indications for the use of the product were clearly explained. We were able to examine and handle the instruments and the tape during the training session. The surgical technique was clearly described by the course faculty including tensioning techniques. Potential complications were discussed and suggestions were made regarding managements of these complications. The cadaver lab provided me with the opportunity to pass the trocars multiple times and develop comfort with the product. My first TVT procedure was performed under the guidance of an expert proctor. After developing expertise in performing TVT, I became a faculty member at training courses. This was through Ethicon as well as other medical training companies. We were required to educate physicians in performing the TVT procedure as was specifically described in the IFU. We spent a large amount of time on patient selection emphasizing that this procedure was indicated for use in patients with stress incontinence only. Complications including retention of urine, voiding dysfunction, mesh exposure, mesh erosion into the bladder or the urethra, pelvic pain, dyspareunia and UTI were discussed at length. We discussed the management options for all the potential complications. In the cadaver lab, I personally guided all the trainees through the entire TVT surgery technique. We spent a large amount of time answering questions posed by trainees. These sessions had a core presentation but were designed to encourage active discussion on advances in TVT surgical technique, management of complications, and new literature focusing on TVT results. In addition, the physicians that served as experts discussed their long term experience with the performance of TVT which included success rates and how they specifically managed complications they saw when performing the procedure. On occasion, I have been asked to be a TVT preceptor and would have 2-3 physicians observing several TVT's. Prior to the actual procedure, I would instruct the physician on performance of the procedure on an inanimate model.

I began using the TVT-O device shortly after it was introduced to market. Similarly to what I discussed above, I was taught how to do the procedure and since then I have taught others

how to do the procedure. As discussed below, all of the residents and fellows I have trained are instructed how to implant mid-urethral slings.

I have not been involved in any Ethicon sponsored education events as a proctor, preceptor or speaker in the last 10-12 years. I am primarily engaged in the training of OB/GYN residents and urogynecology fellows at The University of Maryland in the performance of the TVT procedure. All graduates of my program at The University of Maryland Medical Center are capable of performing this procedure upon graduation of the program. They are well aware of the indications, potential complications and management of any adverse events that may occur with this product.

Credentialing:

The Ethicon professional educational program is not and should not be considered a credentialing process. Ethicon provides a certificate confirming that a trainee surgeon did attend a product specific course on an Ethicon product such as TVT or TVT-O. Their certificate shows that the physician made an attempt to be educated on the procedure and Ethicon's efforts to provide exposure to their products. The certificate is by no means an indication that the physician was proficient at performing the procedure.

Physicians that attend courses for the TVT devices are urologists, urogynecologists and gynecologists who perform surgical procedures. Each of these physicians based on their training and Board Certifications have the privilege to perform incontinence operations. Some physicians will have more extensive exposure to continence surgery in their training program and feel great comfort perusing new surgical techniques used for the treatment of stress incontinence. Consequently, a didactic session and cadaver lab may be over kill for some highly qualified surgeons and insufficient for others. It is not the responsibility of Ethicon or any other medical device manufacturer to assess the surgical skill set of the trainee physician. Nor is it the responsibility of the physician faculty to assess the skill set of the trainees. Both Ethicon and the faculty at Ethicon sponsored courses are simply charged with the responsibility of presenting the product, appropriate patient selection, surgical technique, possible complications and management of complications. Responsibility for credentialing should always rest with the hospital or surgery center. Each facility has to decide how much training in new techniques is necessary to grant surgical privileges. It is the physician’s responsibility to know the pelvic anatomy, understand biomaterials and proper selection of patients for the procedure. TVT devices are merely a kit to help the surgeon place a mesh graft in the vagina using a trocar system for anchoring that decreases the amount of dissection required and allows a reliable anchoring mechanism for the graft. The TVT system does not in any way make the surgeon competent in anatomy, proper dissection, tunneling, graft deployment and wound closure.

At The University of Maryland, all surgeons who are credentialed to perform the TVT procedure must provide the credentialing committee with evidence that they have been properly trained in the procedure. This is done through documentation through their residency program director. Older established physicians who were not trained in TVT in their residency program may choose to attend a training course and then are proctored by a physician at The University of Maryland to ensure they are properly trained in the procedure. Once they have completed the

proctoring sessions satisfactory, they are credentialed to perform the procedure independently. The hospital maintains expert physicians who are able to assist in the event that any adverse events or complications occur.

Balancing of the risks and benefits of TVT:

I have been asked by counsel to discuss, from the perspective of a surgeon and as a physician who teaches and has taught the implantation of TVT to Residents, Fellows, and attending physicians, whether TVT's benefits outweigh its risks and the six factors set forth below. I strongly believe that the benefits of TVT outweigh its risks for the reasons I have stated in this report.

Obviously, every medical device and surgical procedure can lead to a complication. Given that fact, why is it that we choose to operate? Because SUI is a debilitating and embarrassing condition that severely impacts many patients' quality of life. Many of our patients have failed conservative management and have concluded, in conjunction with their surgeon, that the potential benefits of surgically treating their SUI outweigh the potential risks. For many patients, a midurethral sling is the best choice.

(1) The usefulness and desirability of TVT.

As discussed above, midurethral slings, including TVT, are the current world-wide gold standard for treating SUI and are recommended by every professional organization that has offered opinions on this procedure (AUGS/SUFU, AUA, NICE, and others). The reason that midurethral slings are the current world-wide gold standard is that they represent the best risk-benefit profile for patients who want surgical correction for their SUI. The efficacy, including the long-term efficacy, achieved with midurethral slings is high. And the morbidity is low. When compared to non-mesh procedures TVT has fewer adverse events and less voiding dysfunction, offering a better alternative to patients with SUI. There is substantial safety and efficacy data in the surgical literature supporting the role of midurethral sling. If there was a device or procedure that presented a better risk benefit profile for our patients, we would begin using that procedure and cease using midurethral slings. Two decades after its introduction, there is no better procedure or device for the surgical treatment of SUI. For this reason, as a surgeon and educator, I believe TVT is a very useful and desirable product for my patients.

(2) The safety aspects of TVT, the likelihood that it will cause injury, and the probable seriousness of the injury.

Midurethral slings are the most studied anti-incontinence procedure in history. [AUGS 2014]. As discussed above, TVT, like every medical device or procedure that has ever been invented, can cause complications. However, the epidemiological literature and my clinical experience show: (a) that TVT's risk profile is equal to or better than the alternatives; and (b) that when complications occur, they are usually easily treated. This has been clearly shown in the surgical literature. There have been thousands of articles looking at these issues. Of course, there is a potential risk of a bad outcome. But that is true for any procedure and does not change the fact that for the vast majority of patients, their quality of life is improved and their risks of adverse outcomes are low. Thus, from the perspective of a surgeon and educator, I believe TVT presents a very good safety profile.

(3) The availability of a substitute product which would meet the same need and not be as unsafe.

Surgeons, medical device manufacturers, inventors, and others are constantly innovating. We are always looking for ways to build a better "mouse trap" that will improve outcomes for our patients. Two decades after their introduction, midurethral slings remain the best surgical treatment for SUI. At this time, there is no alternative product or procedure that works as well as TVT and presents less risk.

(4) The manufacturer's ability to eliminate the unsafe character of the product without impairing its usefulness or making it too expensive to maintain its utility.

I am not a manufacturer and can only comment on this from the perspective of a surgeon. Almost 20 years after its introduction, there is no product on the market (or procedure) that eliminates the risks presented by TVT. As discussed above, the only unique risk of a midurethral sling (as opposed to the risks presented by all vaginal surgeries) is that of mesh exposure or erosion. This risk is inherent in the utility of the device in two ways. First, every implantable (mesh, sutures, biologics) has the potential to erode. Second, without the mesh, there would be no repair. I am not aware of any way that the risk of mesh erosion or exposure could be eliminated or reduced and note that the risk is low and well understood by surgeons. Although midurethral slings do present this risk, they also offer benefits over the other procedures in reduced total morbidity and equal or increased efficacy. These results have been proven by numerous clinical studies, meta-analyses, and my clinical experience.

(5) The user's ability to avoid danger by the exercise of care in the use of the product.

Through the use of professional education and training, it is possible to reduce, but not completely eliminate, the risk presented by TVT. This is true of all surgical procedures. I have personally taught many surgeons to safely use this procedure, as I have with many other types of surgical procedures.

(6) The user's anticipated awareness of the dangers inherent in the product and their avoidability, because of general public knowledge of the obvious condition of the product, or of the existence of suitable warnings or instructions.

Again, midurethral slings are the most studied anti-incontinence procedure in history. As a result of the thousands of articles published on midurethral slings and the millions of women who have been implanted with midurethral slings, we are very familiar with the risks presented by these products and their complications. As a surgeon and educator, I know the risks of these products. As set forth above, the warnings and instructions are suitable and explain the risks.

Summary of opinions:

1. Urinary incontinence affects approximately 50% of women and has a tremendous effect on the patient's quality of life.

2. Surgical options prior to the midurethral sling had lower success rates, higher morbidity, were more invasive, and required longer hospital stays. Some of these procedures were accompanied by high rates of complications.

3. Specifically, open abdominal procedures to repair bladder neck are not the standard of care any longer. They require large abdominal incisions, longer operative time and recovery, are much more invasive resulting in more morbidity, have lower success rates over long term, higher rates of voiding dysfunction leading to pelvic organ prolapse, and if there is over tensioning, the repair is much more difficulty to correct.

4. Laparoscopic Burch colposuspension has had the same problems as the Burch as listed above, except that they are less invasive. This procedure is much more difficult to perform, has a higher learning curve and is not easily mastered by most physicians. Complications may be higher, although data on this approach is limited.

5. Fascial slings are appropriate for patients, but usually do not show the success rate of TVT over time. They have higher morbidity and are associated with longer hospital stays and recovery time. Some studies indicate that complication rate may be higher than with TVT. There are no long term studies on fascial slings and some studies have begun to show deterioration of efficacy with fascial slings over time.

6. TVT was developed by Dr. Ulmsten as a midurethral sling and was first sold in the United States in 1998. It, along with other Type I Macroporous midurethral slings have become the standard of care for treating SUI.

7. AUA, AUGS, SUFU, NICE and most, if not all, major organizations recognize TVT, TVT-O or other Type I Macroporous midurethral slings as the standard of care worldwide.

8. The TVT is the longest studied device for SUI. It is the most studied procedure for the treatment for SUI when compared to all other types of SUI procedures. The TVT-O has also undergone significant study. Both procedures have high success rates with low complication rates. The benefits of TVT and TVT-O far out way the risks.

9. Polypropylene is the most used material for pelvic floor repair. TVT and TVT-O provide an appropriate inflammatory response in the body that leads to tissue integration. The inflammatory response usually does not lead to clinical effect for the patient.

10. TVT and TVT-O do not show clinically significant contracture rates.

11. TVT and TVT-O are an appropriate, well recognized treatment for stress urinary incontinence. The TVT system is not defective.

12. As a knitted implant for surgical treatment of SUI, macroporous, monofilament, light weight polypropylene has demonstrated long term durability, safety and efficacy for up to 17 years.

13. Multiple randomized, controlled trials comparing types of MUS procedures as well as comparing the MUS to other established non-mesh SUI procedures have

consistently demonstrated TVT and TVT-O's clinical effectiveness and patient satisfaction.

14. Full length midurethral slings, both retropubic and transobturator have been extensively studies and are safe and effective relative to other treatment options and remain the leading treatment option and current gold standard for stress urinary incontinence worldwide. Over 3 million MUS slings have been placed worldwide.

15. In 2013, the FDA website stated clearly that: "The safety and effectiveness of multi--incision slings are well established and in clinical trials that followed patients for up to 1 year."

16. In the position statement of AUGS and SUFU, the procedure is described as the most important advancement in the treatment of stress urinary incontinence in the last 50 years and has the full support of both organizations in the treatment of stress urinary incontinence.

17. Ethicon includes an IFU with each device. The IFU is intended for surgeons and appropriately identifies the indications for TVT and TVT-O, the respective procedural steps, how to insert the devices, the contraindications, warnings and adverse reactions.

18. Pain and dyspareunia are potential symptoms of almost all of the adverse reactions listed. This is true for all surgical procedures for stress urinary incontinence. Pain and dyspareunia is very rare with TVT and TVT-O.

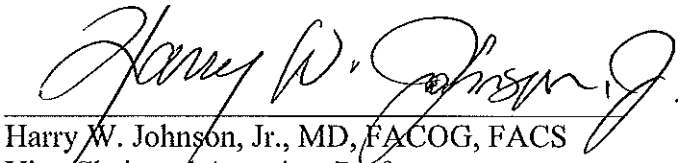
19. The IFU properly warns physicians of the adverse reactions that may occur with TVT and TVT-O.

20. The TVT and TVT-O IFU and patient brochures are appropriate and provide physicians and patients with the appropriate information to facilitate proper counseling. The brochure is not a substitute for the patient and physician conversation. It is not designed to provide informed consent to the patient.

21. Ethicon does not supplant the role of the physician in determining the appropriate treatment for a particular patient.

22. Ethicon has a comprehensive professional education program to provide training on its TVT products. It allows for physicians to obtain as much training as they would like. The professional education program does not certify the physicians as capable of performing the procedure. The physician, along with his professional organization or hospital, must ensure that he or she is capable of performing this surgery.

This 16th day of June of 2016.



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